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THE MOA AT HOME.*

EVERYONE who has written anything about New Zealand for the past thirty or forty years, whether about its inhabitants, its archæology, its natural history, or its geology, has had much to tell us about the great wingless birds that once inhabited that group of islands. From this great mass of material we have endeavoured to sift out the leading and most important facts, and present them to our readers in a brief summary.

The Rev. Richard Taylor, F.G.S., thinks he was the first discoverer of the Moa, the name given to all these great fossil birds. While journeying to Poverty Bay, in the early part of 1839, he found the bone of a Moa near the East Cape, which the natives told him was the bone of a large bird which they called Tarepo, and which lived on the top of Hikurangi, the highest mountain on the east coast. He found later that the natives of the west coast called the bones Moa, and were entirely ignorant of the name Tarepo.

It seems probable, however, that to the Rev. W. Colenso, F.G.S., belongs the honour of first discovery of the Moa, as he was the first also to investigate the nature of the fossil remains and determine the struthious affinities of the birds to which the bones belonged. In 1842 he wrote:—"During the summer of 1838 I accompanied the Rev. W. Williams on a visit to the tribes inhabiting the East Cape district. While at Waiapu I heard from the natives of a certain monstrous animal, while some said

* From Ward's 'Natural Science Bulletin' (Rochester, New York), 1883.



it was a bird, and others a person. All agreed that it was called a Moa; that in general appearance it somewhat resembled an immense domestic cock, with the difference, however, of its having a 'face like a man's'; that it lived on air, and that it was attended or guarded by two immense Tuataras, who, Argus-like, kept incessant watch while the Moa slept. Also, that if any one ventured to approach the dwelling of this wonderful creature, he would be invariably trampled on and killed by it." "A mountain named Whakapunaki, at least eighty miles distant in a southerly direction, was spoken of as the residence of this creature; here, however, only one existed, which, it was generally contended, was the sole survivor of the Moa race. Yet they could not assign any possible reason why it should have become all but extinct." "While, however, the existence of the Moa was universally believed (in fact, to dare to doubt of such a being amounted, in the native estimation, to a very high crime), no one person could be found who had ever seen it." "Many of the natives, however, had from time to time seen very large bones, larger, from their account, than those of an ox; these bones they cut up into small pieces for the purpose of fastening to their fish-hooks as a lure, instead of the *Haliotis* shell."

Other Europeans have been told this same myth, and other high mountains have been designated as the dwelling-place of this strange creature. It is hardly necessary to add, however, that subsequent explorations have failed to reveal the hiding-place of "the last Moa," and that we owe our entire knowledge of the bird to the study of its fossil remains. These have been found in many places and under varying conditions.

According to Dr. Haast:—"The oldest beds containing Moa bones are proved to belong to the great glacier period, where they occur in morainic accumulations and silt beds, as well as in fluvial deposits, formed by rivers having issued from the terminal face of gigantic glaciers during that period. Here they have been traced as low as one hundred feet below the surface. In the loess deposits they are also of frequent occurrence, where their existence has been proved to a depth of more than fifty feet. Advancing to the quaternary period, Moa bones are found in turbary deposits, or in silt or loess on the plains or lower hills, in caves and in fissures of rocks; in fact, everywhere where favourable conditions for their preservation prevailed."

"From the observations we were thus able to make the conclusion has been forced upon us that these gigantic birds must have been able to sustain life over a long period, because the same species which occur in the lower lacustrine and fluviatile deposits are again found in the bogs and swamps, in the fissures of rocks, and in the kitchen middens of the Moa-hunting race, which latter evidently marks the end of the *Dinornis* age."

Dr. Hector mentions heaps of bones, with stone implements, on the top of Corrio Mountains (South Island), 5000 feet above sea-level.

Mr. B. S. Booth ('Transactions of New Zealand Institute,' 1874) gives a very interesting description of a Moa-swamp at Hamilton. He says:—"The surface lagoon, before being disturbed, was rather higher than the surrounding surface, and consisted of from one to two feet of black peat mixed with a blackish silt, which rested on and was mixed with the bones to the very bottom." Below the bones there was one foot of a fine whitish, very soft, and somewhat elastic clay. "The bones were deposited principally in the north-east part of the lagoon, in a space exactly the shape of a half-moon, forty feet from point to point, and eighteen feet across the centre, and varying from two to four feet deep."

He estimates that nearly seven tons of bones were taken out of this space, most of which were badly decomposed, and that the number of individual birds could not have been less than 400. The bones "lay in every imaginable complication of tangle," with "no bone on top."

"A great quantity of quartz gravel and smooth pebbles occurred among the bones, and in the shallowest parts of the deposit, under pelves or breast-bones which had not been disturbed, they lay in bunches." "There was no gravel in the lagoon except amongst the bones, and no small gutter or water-course could be found by which it might have come in."

The only explanation apparently which can be given for the presence of the pebbles is that they were brought there in the gizzards of the birds. This theory is supported by numerous instances where similar pebbles have been found connected with Moa bones in such a way as to admit of no other explanation than that they were connected with the birds. The bones on the top were in a much better state of preservation than those at the

bottom. There were a large number of bones that had been broken and healed. "A disease of the foot appeared to have been very prevalent amongst them, as a great number of the joints presented unmistakable indications of rot, so much so that some of the toe-joints had even grown together."

There were no bones of young birds near the top, and no fragments of eggs were found anywhere in the deposit, although careful search was made for them.

After stating these and other facts Mr. Booth goes on to discuss the different theories to account for this wonderful accumulation of bones. He shows that they could not have been deposited by running water, neither could the Moas have been surrounded and driven in there in such great numbers by sweeping fires; the birds could not have been bogged, certainly not the later ones, with two or three feet of solid bones under them. And that the bones were not thrown there by savages seems proven by the fact that not a trace of their work could be found, not a hacked or scratched bone, nor an implement or trinket of any kind.

Mr. Booth thinks that a true explanation of the deposit explains the extinction of the Moa, at least in that section, and that that time was much earlier than the date generally accepted, and was caused by the gradual lowering of the temperature until the warmth of the earth and air was not sufficient to hatch the eggs of these birds, from which time they gradually declined, until they finally all disappeared. "When the frost and snow of winter began to set in, though far milder than now, it would have distressed the Moa, as, on account of its great size, it could not find shelter like smaller birds; hence it would select places where it found the most warmth."

The spring-water in the bone-pit, being of the same temperature as the earth, and far above freezing-point (in fact, it may have been a thermal spring), when all round the bird could not put down his foot without being bitten with frost, or without placing it in snow and ice, what would be more natural for them than to step into this comparatively warm water, which to some extent would relieve their suffering from cold in their lower extremities? Thus, the period when frost and snow began to set in, I place as the commencement of the deposit of bones in this pit. The accumulation would have been very gradual, perhaps

for centuries, and the periodical deposits would only have increased at the same rate as the frost and snow. This process continuing, until not even in the most favoured places would their eggs hatch, and the last of their race were, therefore, doomed to annihilation, a period would arrive which must have been with the poor birds a time of indescribable suffering. Thus afflicted with pain, famishing with hunger (as whatever their food was it lay deep under the snow-mantle of the earth), and, finding cruel nature arrayed against them, pinching their bodies with piercing winds, from which they had no shelter, and cutting their feet with ice and frost, were it only as an alleviation of pain when dying, I can see nothing more natural than for them to have plunged into this spring. The water, being of the same temperature as the earth, would feel quite warm to them, and, there being no inducement for them to get out, as their food was cut off, they would settle in deeper and deeper, and remain till numbness and hunger put an end to their suffering.

Hence I account for the bones being soundest on the top, as they would have been deposited so much later. Hence also I account for there being no bones of young birds on top, as it was long after incubation ceased that the old family was gathered to its resting-place. Hence I account for the absence of egg-shells, as these deposits only took place in the winter season, which was never the breeding season with the birds. And by the trampling round of the birds in the spring I account for the equal distribution generally of the gravel amongst the bones, the trampling being the disturbing cause from which alone some bunches of gravel from the gizzards escaped by being covered with a breast-bone or pelvis.

Mr. Booth further adds:—"If it is asked, why are there no bones in the surrounding lagoons? my answer is, that as they are all (as far as I have examined) surface-lagoons, they would have been frozen over when the cold drove the birds into the spring-water, which never froze."

This theory of Mr. Booth's has much to recommend it, and we agree with him that the theory of cold seems more plausible to account for the heaps of bones at Lake Wakatipu, described by Dr. Hector, than the theory of fire which the Doctor advances. The Moas would certainly have been quite as likely to have sought shelter under a precipitous ledge of rocks to protect them

from cold snow-storms as from sweeping fires, and would have been much more likely to have reached such shelter. "Notwithstanding, they perished in clusters. This occurring periodically, perhaps for many years, would naturally account for the many distinct skeleton heaps found by the Doctor in that place."

Many, many pages have been written in relation to the time when the Moa became extinct. That it was contemporary with man, and owes its final extinction to him, is a fact accepted by all, but whether the old Moa hunters were the ancestors of the present New Zealanders, or, if not, whether the ancestors of the Maories hunted the Moa at all, or inhabited the islands before the Moas were all gone, is still a disputed question, with competent observers on each side.

As bearing on the time when the Moa became extinct in that part of the South Island, we quote again from Mr. Booth's paper:—"I find below a certain level that would leave the whole Maniototo Plains under water; there are no Moa bones to be found, with the exception of about the mouths of the burns coming in from the hills, where the bones have been brought down by freshets." "Now what does this fact point to? The only answer I can give is that the Moa was extinct in this locality when the whole Maniototo Plains, from the level spoken of, was yet under water." These statements by Mr. Booth agree well with the position maintained so stoutly by Dr. Haast, previously quoted, who is the strongest and most prominent defender of the theory of the early extinction of the Moa throughout the whole of New Zealand. He claims that it became extinct before the occupation of the islands by the present Maori race, and gives us a great deal of geological data in support of this position. At Moa-bone Point cave he found a stratum "three or four inches in thickness, mostly consisting of refuse matter from human occupation, and of ashes." "It was especially in some localities, as for instance near the entrance of the cave, replete with kitchen middens of the Moa-hunters," among which were found polished and unpolished stone implements, a few small tools made of bone, personal ornaments, fire-sticks, &c. "And now, as it were at once, the Moa-hunters disappeared from the scene," and the cave remained uninhabited for a considerable space of time, as shown by "the clear line of demarcation between that layer and the shell-bed above it, in which no Moa

bones were found," and by the deposit of blown sand between the two, about a foot thick at the entrance of the cave, and gradually thinning out as it advanced towards the interior. Below this line Moa bones and fragments of egg-shells were very abundant, and with them were the bones of seals and a few other animals. Above this line, which doubtless represents a long interval of time, there were no remains of the Moa to be found, and the deposits showed the cave to have been occupied for a long period by a race who lived mostly upon shell-fish, a food which was apparently used very little by the Moa-hunters. Dr. Haast and others give us the details with reference to a number of other localities which tell the same story, *viz.*, that the Moa and Moa-hunters flourished and passed away, and that another race, with different habits, *after a long interval*, occupied the same places; still after all it may have been the same Moa-hunting race returned, after long wanderings, to their former habitat. There being no more Moas to eat, they feasted on shell-fish.

The Reverends W. Colenso and J. W. Stack, gentlemen versed in Maori lore, have reached nearly the same conclusions as Dr. Haast, from entirely different data. According to these gentlemen the old traditions, songs, and poetry of the New Zealanders furnish no evidence that they knew aught of the *Dinornis*. The word Moa occurs but seldom in their songs and legends, and has various other meanings besides that of a large bird, and it was sometimes used figuratively in allusion to the myth that the Moa lived on air. A love-sick maiden who mourned her lover and would not eat was christened *Hinemoa* (the young lady who lived on air).

Mr. Colenso has evidently given this whole subject a great deal of time and careful study. In his paper, written in 1842, previously referred to, he says:—"From native tradition we gain nothing to aid us in our inquiries after the probable age in which this animal lived; for, although the New Zealander abounds in traditionary lore, both natural and supernatural, he appears to be totally ignorant of anything concerning the Moa, save the fabulous stories already referred to," and thinks it certain that this would not be the case if such an animal lived within the times of the present race; but in an exhaustive paper, published in the *Trans. of the N. Z. Institute* three years ago, he sums up his final conclusions thus:—

"1. That the bird Moa (some of those of its genera and species) was really known to the ancient Maori.

"2. That this happened very long ago, in almost pre-historical times; long before the beginning of their genealogical descents of tribes, which, as we know, extended back for more than twenty-five generations.

"3. That this conclusion is the only logical deduction from all that I have been able to gather, whether myth, legend, proverb, song, or the etymological rendering of proper names of places, persons, &c."

In regard to the numerous accounts published of Maori descriptions of the Moa, he says:—"From January, 1838 (when I first heard of the Moa), down to 1842, and later, no man could possibly do more than I did in my quest after it, and no man could have had better opportunities." "And I again assert that it was through me that the Maoris generally got to know of the Moa having been a real (or common) bird. I showed them repeatedly, at the station, the plates in 'Rees' Cyclopædia,' containing all the struthious birds, and told them of their habits, &c., and of my opinion of the extinct Moa; that information was carried almost everywhere (with no doubt many additions), and that information, together with simple leading questions on the part of the inquirers (especially when put by the governor of the colony, or any superior,—which, according to Maori etiquette, would not be negatived even if wrong), and also with but a small knowledge of the Maori tongue on the part of the Europeans, fully explains all to me, and that very satisfactorily."

Mr. Colenso remarks that the condition of things forty years ago, or before the colony was established, was very different from what it is now, and says his inquiries "were carried everywhere throughout the length and breadth of the North Island; they were the constant theme of conversation among the Maoris, who then had little of a novel nature to talk over,—increased from the fact of rewards being offered for bones, feathers (if any), and for information."

It requires but little knowledge of the workings of the savage mind to see the force of these arguments.

Notwithstanding, many competent observers believe that the Moa became extinct in very recent times, Dr. Hector, Director

of the New Zealand Geological Survey, among the number. Mr. Walter Mantell (son of the eminent geologist) was the first explorer of the artificial Moa beds, soon after the settlement of the colony, and advanced the idea that Moas existed to very recent times. And Mr. Mantell seems very certain that Maoris in the South at the date of his early explorations, in 1846, were well acquainted with the former existence of the Moas and the circumstances which led to their extinction. He also thinks that cannibalism prevailed, but in the North Island only, at the time the Moa was used for food.

Several bones of the Moa, with the dried ligaments still attached, have been found, together with portions of the skin and a few feathers, although Dr. Haast claims that the conditions were exceptionally favourable for their long preservation; others contend that they cannot be very many years old.

Capt. Hutton thought that the weight of evidence goes to show that the remains from the Earnslugh Cave "are not very old, and that probably they do not date further back than the commencement of the present century," but, in speaking of the bones with dried skin from the Knobby Ranges, found more recently (1874) in a crevice among the rocks, he says:—"The extraordinary juxtaposition of decayed and lichen-covered bones with well-preserved skin and flesh seems to me to point to some peculiarity in the atmosphere which enabled flesh to resist decay when shaded from the rays of the sun, and by no means to prove that the bird to which this neck and flesh belonged lived at a later date than those whose bones we now find buried under the soil."

D. W. Murrison thinks that if what Dr. Haast and Mr. Colenso say is true for the North Island, it certainly cannot be made to apply to the South Island, and says:—"I think, from the evidence we are in possession of, there is every reason to suppose that the *Dinornis* has existed within the last hundred years." And thus the discussion is kept up as to the time when the Moa became extinct.

As a sample of the traditions which Mr. Colenso explains away, we quote from Mr. J. W. Hamilton (Trans. N. Z. Institute, 1874):—"In 1844, at Wellington, I was present, as Governor Fitzroy's private secretary, at a conversation held with a very old

Maori, who asserted that he had seen Captain Cook. This Maori, so far as my memory now serves me, I should guess was seventy years old; at all events, he was brought forward as the oldest of his people then residing about Port Nicholson. Being asked had he ever seen a Moa, he replied, 'Yes, he had seen the last one that had been heard of,' and, on being questioned, described it as a very large bird with a neck like that of a horse." Mr. H. further says:—"In 1844, and for many years later, it was believed by our people for a certainty that the Moa was still to be found alive in the South Island, of which very little was then known," and that stories were currently reported of one or two old settlers in the South about Otago and Foveaux Straits who had actually eaten Moa-flesh.

For details of the osteology of these birds we must refer to Prof. Richard Owen's descriptions, published in the 'Transactions of the Zoological Society of London,' begun in November, 1839. Prof. Owen at first made two genera, *Dinornis* and *Palapteryx*, but afterwards discarded the latter genus and referred all the different species to the genus *Dinornis*.

In 1875, Dr. Haast, Director of the Canterbury Museum, proposed two families, with two genera in each family, thus:—Family *Dinornithidæ*, (a) genus *Dinornis*, (b) genus *Meinornis*; and family *Palapterygidæ*, (a) genus *Palapteryx*, (b) genus *Euryapteryx*.

Under these four genera, as proposed by Dr. Haast, there have been about twenty species described. These species are founded mainly on the size and proportion of the bones, particularly the bones of the leg; and it is not improbable that as more careful comparisons are made of larger series of bones, the number of species will be reduced. It is an interesting fact that Cook's Straits, which separates the two islands, "seems to have been an effectual bar to any migration from one island to the other," as the same species are not found on both islands. Prof. Owen infers from the beak of the *Dinornis*, "formed after the model of the adze or pickaxe," and "the robust proportions of the cervical vertebræ, especially of their spinous processes," that it had "a more laborious task than the mere plucking of seeds, fruit, or herbage," and that "the beak was associated with the feet in the labour of dislodging the farinaceous roots of the ferns that grow in characteristic abundance in New Zealand."

Portions of dried skin and a few feathers of the Moa, as already stated, have been found; the colour of the barbs of the feathers are chestnut-red, and the rounded portion of the tip is white. These feathers, according to Captain Hutton, show the bird to have been more nearly allied to the American Rhea and Emu than to any of the struthious birds of the Old World.

Fragments of Moa eggs are quite numerous, particularly in the kitchen-middens of the Moa-hunters, and a few nearly or quite perfect specimens have been found. Dr. Hector describes one 8.9×6.1 inches diameter, which contained the remains of an embryonic chick. Another specimen measured 9.5 inches long.

These are certainly monstrous eggs, and yet the fossil bird of Madagascar (*Epyornis*), although a smaller bird than the great *Dinornis*, laid a much larger egg, two specimens of which are in the Jardin des Plantes, Paris, and measure respectively 13×9 and 12×10 inches in diameter. And yet, after all, neither of these birds laid so large an egg, in comparison to its size, as does the Apteryx of New Zealand at the present day.

And now, as a fitting close to this brief summary, we quote from Prof. Owen's paper on the *Dinornis*:—"The extraordinary number of wingless birds, and the vast stature of some of the species peculiar to New Zealand, and which have finally become extinct in that small tract of dry land, suggest it to be the remnant of a larger tract or continent over which this singular struthious fauna formerly ranged. One might almost be disposed to regard New Zealand as one end of a mighty wave of the unstable and ever-shifting crust of the earth, of which the opposite end, after having been long submerged, has again risen with its accumulated deposits in North America, showing us in the Connecticut sandstones of the Permian (Trias) period the footprints of the gigantic birds which trod its surface before it sank; and to surmise that the intermediate body of the land-wave, along which the *Dinornis* may have travelled to New Zealand, has progressively subsided, and now lies beneath the Pacific Ocean."

ON THE TREATMENT OF SNAKES IN CAPTIVITY.

BY ARTHUR STRADLING, C.M.Z.S.

(Continued from p. 251.)

BEFORE turning the snakes into any sort of cage, a minute examination of the interior should be made, to see that no defects exist. The strength of all joints and fastenings should be tested, as well as the firmness of the tree, and special care must be taken that no points of nails or sharp edges of glass project, and that the heating apparatus, if any, is sufficiently guarded from contact; frequent trials of its efficiency and freedom from leakage are a requisite precautionary measure also. We have already laid stress upon the desirable roughness of the branch, and the importance of leaving no apertures or narrow spaces wherein the snakes may do themselves an injury; to this may be added the advice that everything within the cage should be practically immovable. It is wonderful what heavy bodies they manage to capsize and push about, and if any possibility of doing this be open to them they may hurt themselves, break the object, or damage the sides or glass by its fall. No decorative carving, and still less paint or varnish, is admissible inside. If the cage is to be painted on its exterior it would perhaps be as well to remove them until the smell has gone off, though, as far as I have seen, this has little or no effect upon them. They will not eat a putrid carcass, but they shew no repugnance to its effluvia, and will even seek shelter beneath it, or curl up composedly on the rotting body of a deceased comrade. An irritant vapour, such as ammonia, will disturb them by its effect on their mucous membranes, as it would any other creature; but I used to keep snakes in small cabins on board ship, as well as in very limited apartments on shore, which were wont at times to be very foggy with tobacco-smoke, years before I heard of their alleged antipathy to nicotine, without any visible prejudice to their well-being. I never use soap, soda, carbolic acid, or anything but hot water and a brush or cloth, however, in cleansing any portion of the cage or its arrangements.

For the doors, or any other part capable of being opened, a very safe and simple fastening will be found in a bent staple, so fixed as to project through an aperture in the frame of the door

when shut, and then secured with an ordinary steel split-ring, such as is used for a bunch of keys. After some experience, I can strongly recommend this method in preference to any other, for the cages of *all* animals. Locks get foul and out of order, and keys are mislaid; bolts, buttons, catches and pins slacken after a time, and are liable to be displaced by accident; moreover, their closure is apt to be neglected "just for a moment," as confidence begets a certain amount of indifference to security—one day it is forgotten altogether, because nothing unusual in the appearance strikes the eye—and the next thing is the discovery of a snake in somebody's bedroom. A split-ring, on the contrary, must be honestly and obviously either on or off, and cannot possibly be shaken asunder or dislodged by any means short of the deliberate process of unthreading it from the loop on which it hangs. The staple must not project far enough to allow the door to be loose. For their own sakes, quite as much as for the peace of mind of all whom they may concern, snakes cannot be too rigorously guarded. All doors should lie wholly upon the outside of the cage when closed, and their lower margin ought never to be above the level of the actual floor, so that the latter may be thoroughly swept out at times.

It is well in many cases to have a sliding partition adapted to the cage, by which it can be divided into two separate compartments at pleasure, for convenience in feeding, cleaning, the isolation of a specimen, and many other reasons. Its mechanism must be left to the judgment of the reader, as may be most suitable to the construction of his particular vivarium and the purpose for which the division is thought necessary. All that need be said about it is that its future requirements must not be forgotten in allotting the length and slope of the tree, and that the slit through which it is to be introduced must be not only securely covered but filled up when it is not in use. Snakes which cannot be removed with the hands may be allowed to crawl into a box or bag placed within the cage; if a bag be used, its mouth should be distended with a big stone, or something equally heavy and bulky, to admit of their finding the aperture, and at the same time prevent their passing beneath it. This can be pulled out and the bag tied when they have entered; on no account let it fall within. There will be no difficulty in inducing them to go into a box or anything else that is penetrable, as soon as they

perceive it; they are as inquisitive and fond of novelties as monkeys.

The changes which go on in a reptile's economy are so slow and involve so low a degree of oxygenation, that it demands very little "fresh air." Such dimensions for the snakes' abode as we have given are called for to permit of their taking adequate exercise, not by respiratory necessities. People often exclaim, "Why, they won't be able to breathe!" when they see a cage closely covered in cold weather, not heeding that the inmates have relatively quite as much air as we enjoy in a room with the door and window shut and the chimney stopped up, and certainly ignorant of the fact that the amount of oxygen in the cage would be sufficient for its inhabitants for perhaps a couple of years without renewal: witness the length of time they will exist in a stoppered bottle. Abundant ventilation, then, is a matter to be desired rather for the comfort of the owner, in insuring a pure atmosphere within the cage whenever he opens it, than to be looked upon as an essential for the health of the serpents themselves. When it can be obtained without sacrifice of warmth, it should, of course, be so ordered; but it is better to check or altogether dispense with a current of air if it entails cold. Every opportunity of airing the interior when the snakes are absent should be seized, and after it has been scrubbed they ought not to be replaced until every part of it is dry, nor should the gravel be spread over a wet floor. The utmost cleanliness must be observed, soiled portions of the gravel removed daily, and the water never allowed to grow foul, otherwise the cage becomes offensive and the snakes very unpleasant to handle. Drainage must be attended to also. The tray of earth and charcoal in the small heated cage is a great deodorizer; where this is not employed, a fine wire basket, filled with coarse pieces of charcoal, placed in some convenient situation, will absorb any bad odour. Some serpents are much more pronounced than others in this respect. The Common Grass-snake has already been noticed, and it is curious that many species closely allied to it have the same peculiarity, the Indian River-snake (*Tropidonotus quincunciatus*) for instance. Most species, when only recently taken and alarmed, have a disagreeable smell, but they soon lose this as they become accustomed to their position. The Rattlesnake has a foetor, under some circumstances, which is

quite characteristic of its presence. Overcrowding and injudicious feeding are sure to give rise to impurity. Serpents which live on frogs and fish are worse, as a rule, than those which prefer birds and small animals, while those that eat lizards are generally destitute of offence.

Fine smooth gravel is the best material for covering the floor, just so large that it shall be too heavy to adhere to the finger (or snakes' bodies) when wetted. Sand sticks to them as they come out of their bath; earth is converted into mud and smudged over the glass, woodwork, or, worse still, the canvas; moss hides them altogether, gets pushed about in unsightly heaps, and is carried into the water to rot; turf combines all these disadvantages with the additional one of allowing the snakes to burrow below it; while bare boards or pavement always look dabbled, stained and dirty. Blankets or rugs should only be put in when it is desired to cover the reptiles, not for them to lie upon, as they will invariably get underneath. The depth of gravel must depend upon the size of the serpents; they will all plough it up with their heads, and the layer ought to be thick enough to prevent the floor from being exposed by their so doing. Snakes, again, which are about to deposit eggs, seem always to have an instinct of burying them, and will sometimes refuse to lay them if they cannot first excavate a hollow of some sort for the purpose. Many valuable specimens which have died in captivity and whose condition has not been recognised until after death, are supposed to have been killed by the retention of their ova, in consequence of their not finding a fit place for deposition. A magnificent West African Python, which suddenly expired in the midst of health at the Clifton Gardens in 1857, and whose body was examined by Mr. Flower, articulator to the Royal College of Surgeons, Mr. Frank Buckland and others, may be quoted as an example. A proper depth of gravel will therefore tend to obviate such a calamity, though, if the state of affairs be perceived, the parturient snake had better be isolated and special treatment pursued. A double quantity of gravel should be provided, so that half may be thoroughly washed and dried while the rest is in the cage; in this way the layer may be changed frequently without inconvenience. Damp or dusty gravel ought never to be put in. The stones must not come into contact with glass or canvas, which should be protected by a ledge in such a

manner that the lowest exposed margin is a little above the surface of the layer. Allusion has been made to the evil of getting the gravel wedged between the frame and canvas in the cold cage; with glass it is almost as bad, since this gets scratched by the pebbles which the snakes squeeze against it as they pass along, and becomes friable in consequence. A good deep ledge should guard the doorway too, and prevent the stones from tumbling out or blocking its return when it is opened; this, however, must be movable, to allow the whole to be cleared out without embarrassment when necessary.

Slowworms are often associated with Common Snakes in an unheated cage, and very pretty little creatures they are, though presenting no points of any especial interest. These ought to have earth or moss in addition, and will not live comfortably upon the gravel, though they have no objection to taking frequent promenades over it. Their requirements may be combined with those of the legitimate occupants, by erecting a little mound of turf in the middle of the cage—upon the floor, not on the gravel—and placing over it a fern-glass, around the lower border of which are pierced a number of smooth round holes, large enough for the slowworms to pass through, but not admitting the snakes. If the dome be not itself sufficiently weighty to prevent the serpents from overturning it, it must be fixed in some way; the turf-heap may be made ornamental with a fern or other plant, and if plenty of worms and maggots be put in, the slowworms will feed themselves there at night. A large flower-pot inverted, with the hole at the top blocked up and smaller ones drilled around its base, will answer the same purpose, if the edges of the apertures be filed perfectly smooth, but has not such a pleasing effect and will require extra weight.

When blankets and rugs are spoken of, coarse horse-cloth may be understood. It is well to avoid the application of such coverings to the snakes bodily, if they can be kept warm with free circulation of air about them; but when it is called for, we must not forget that blankets do not by themselves make a reptile any hotter. If we clothe ourselves with non-conductive material, our heat increases, because the caloric generated by oxidation, as the vital processes go on, accumulates. A snake's temperature depends entirely on that which it receives from its surroundings, except in one or two rare instances, and then only to an extent

which is scarcely appreciable; it possesses no such intrinsic heating apparatus as we have. Blankets, therefore, only keep in whatever heat exists before they are put on; wrap up a warm snake and it will retain its warmth accordingly, but a cold one will become no hotter, though it may be thus defended from an approaching decrease of atmospheric temperature. Where artificial heat emanates from the flooring of a cage, to cover the snakes as they lie upon it will naturally insure their getting the full benefit of the warmth by restraining its diffusion. It is generally better to introduce a box, partially filled with moss (never wool or flannel), and having the lid so fixed as only to leave a small opening at night; and it is amusing to see how quickly they get to know this box, and come swarming over one's hands as soon as the door is opened, in their eagerness to get in—not that they necessarily intend to remain there, by any means! They should be turned out in the morning.

A little *contretemps* sometimes occurs in covering up a snake with a blanket, which must be laughable enough to a disinterested spectator, though vexatious to one who finds that his care and trouble have been expended in vain. You spread the cloth over the reptile as it lies quiescent; but while you are leaning across it, making everything neat and smooth and comfortable, the object of your attention, aroused thereby, is slipping out of the cage underneath your elbow unperceived, and you close the door, satisfied that all is snug for the night, to stumble on the creature as it glides away to a distant corner of the room—just as the clown, who has been concealed at the bottom of a cupboard, dives between the legs of the policeman who is searching the upper shelf! I was once bringing home a very savage Anaconda, about nine feet long, in a deal box which had been converted into a temporary cage by nailing some wire netting over the top; at one end a piece of this netting could be lifted, trapwise, to form a door. I was endeavouring to cover him up one evening, as he lay at the farther end of the box; protecting my hands with the rug, I passed it smoothly in to the full extent of my arms, which brought my chest almost into contact with the opening, and proceeded to push and fold it over him as well as I could at that distance. Suddenly there came a furious hiss, almost in my ear, and I found the enraged reptile's head on my shoulder, close to my face! As I laboriously covered the after part of him, the other

end had been gliding towards me, and had passed out of the box in the space between my breast and the wire; I seized him, however, before he struck, and speedily replaced him.

Cages which contain no fixed tank should be supplied with a water-vessel of a size proportionate to that of the snakes, according to the rules already given (pp. 18—24). This vessel ought to rest upon the floor, not on the gravel, for the reptiles will never cease in their efforts to burrow underneath it if it lies on the surface, and in the end will most likely capsize it. The gravel must be cleared entirely from the space which it is to occupy, for the tiniest pebble underneath will render the pan unsteady and liable to breakage; when it is in position the gravel must close up again around its sides. But since the water has to be changed and the pan washed every day, this process of sweeping back the gravel every time would be one of no small tediousness and difficulty with the serpents moving about; and I find it convenient to use two receptacles, one fitting as accurately as possible within the other—two of precisely the same size and shape will do, provided they are broader at the top than at any other part and are not too thick. The inner one can be removed at any time and returned without trouble, the cavity of the outer being dried with a sponge *in situ*, if need be. Where it can be arranged, glass vessels should always be used, that the snakes may see the water and their mode of swimming and drinking be observed; two gold-fish globes of suitable size, cut at the level of their greatest diameter, are often appropriate, but care is demanded that the bath be not deep enough to prevent the smallest bather from getting out of it again when afloat; for the amount of water must be so regulated that no overflow shall take place, even if all the snakes are submerged, and will therefore commonly be far below the brim. Do not place the vessel underneath the tree, if it can be put anywhere else; see that the edges are not chipped; and never attempt to keep frogs, newts or fish in it, whether intended for food or not. If it be made of opaque materials the gravel should be heaped up around it, or a wooden surrounding contrived so as to reverse the natural overhanging slope of the sides, otherwise little specimens will not find the water readily, and are prone, moreover, to hide underneath the margin. Soft water is to be preferred to hard, when it can be obtained; unfiltered stream or clear pond water would probably

be best. This is a matter which is still open to much investigation, as there is little doubt that errors in this respect often give rise to canker. It ought always to be of the same temperature as the cage when introduced. As cold weather approaches, little or no water should be allowed to snakes which are kept without artificial warmth with a view to hybernation; if given during the day it had better be taken out at night, lest wandering into it, they get numbed and lie there, and so die. On board ship in rough seas, I have sometimes hung up the water-globe, to obviate the unpleasant results which ensue from spilling its contents; but the plan is not to be commended under ordinary circumstances, for—independently of the evident perils of such a position—the oscillation causes a sensation akin to sea-sickness in serpents. They abominate such motion as is produced by agitation of the surface of water; a snake attempting to swim amidst *waves* is powerless.

All should be supplied with water, but different species exhibit very different degrees of inclination for it. The Anaconda's predilection for the bath has been remarked, and most of the great constrictors are equally fond of it. Many Colubers, too, live nearly as much in that element as on *terra firma*, particularly those which belong to the *Natricidæ*, a family including three of the genera before-mentioned—*Tropidonotus*, *Heterodon*, and *Ischnognathus*; their nostrils are placed on the upper part of the nose. On the other hand, some, like the Common Viper and Smooth Snake, rarely drink or bathe, the Rattlesnake perhaps never. At any rate, I can say with confidence that specimens kept by me for several years have never been observed to make use of the water to which they can gain access at any time; *certainly* they have not done so during the year or more since my suspicion of the fact was aroused, or a little hygrometric apparatus would have recorded it, though they have fed well. The only one I ever knew seek the bath had undergone severe injury, and died shortly afterwards.

NOTES AND QUERIES.

The 'Ibis' list of British Birds.—We are glad to be able to announce the publication of this important list of British Birds, which has been for some time in preparation by a Committee of the British Ornithologist's Union. Since its appointment in May, 1878, this Committee has held *seventy-one* meetings, and no pains seem to have been spared to settle authoritatively the list of species which have claims to be regarded as British, as well as to decide the specific names which should be employed for each. It is to be hoped that with a view to secure uniformity in nomenclature our readers will henceforth admit the authority of this list, and adopt the nomenclature recommended in it in all future communications to this journal. The list, which extends to over 200 pages, with an excellent index, has been admirably printed by Messrs. Taylor & Francis, and may be obtained of Mr. Van Voorst, Paternoster Row.

Animal Parasites.—At page 219 I observe an extract from 'Nature' on animal parasites. The two names tick (*Ixodes*) and "ked" (*Melophagus*) are frequently used as synonyms, but only in districts where there are no ticks on the sheep. Where both are found the shepherds can, and do, easily distinguish them. The tick has eight legs, the ked six, and the latter never attaches itself to the sheep, but moves freely about amongst the wool; while the former (the female only), after inserting the barbed proboscis, never quits its hold until the abdomen is fully distended with blood and eggs, when it drops off either dead or dying. There is less chance still of confounding the sheep-louse (*Pediculus*) with the tick. It is a true louse, apparently both rare and local. I have only seen it a few times, but then in great abundance, and always on sheep that had been in low condition, and after they had begun to "mend." The extract concludes thus:—"But I can remember no instance of an *Ixodes* found on a sheep, though I would not undertake to say they never occur on that animal." There are large tracts in the pastoral districts of the South of Scotland—in Roxburgh, Selkirk, Peebles, and Dumfriesshire—where ticks are too common on a sheep; also parts of Galloway, Ayrshire, Lanark, and Argyle. In these districts three species of *Ixodes* occur on sheep, viz.—*I. marginatus*, *I. erinaceus*, and another that I have failed to identify. Can any reader of 'The Zoologist' inform me if there is any work on the British ticks? as I have hitherto failed in obtaining such. Enclosed are two reports, which will show the importance of the subject.—ANDREW BROTHERSTON (Shedden Park Road, Kelso, N.B.).

[The reports forwarded are extremely interesting, but of too great length to be quoted here. One is a report by a Committee of the Highland

and Agricultural Society, and by Principal Williams, F.R.C.V.S.; the other, a report of the Louping-Ill Committee of the Teviotdale Farmer's Club. The term "louping-ill" is said to be derived from *hloupa*, an old Scandinavian word for a staggering gait. The disease (a trembling paralysis) is one which every year entails enormous loss amongst hill sheep, both black and white-faced, particularly in Scotland. It appears to prevail more in the Silurian hill districts of Scotland, and extends from the Hebrides to the southern extremity of Dumfriesshire, being equally prevalent in the district of Langholm and in the Isle of Skye. The cause of the disease is ascribed to a variety of external circumstances,—as soil, pasture, weather, and the influence of ticks. The popular belief in the influence of the tick, or its close connection with the disease, being very general, it was necessary to consider this point very carefully with the view of determining whether any relationship really existed between the parasite and the disease. The result of observations on this point was confirmatory of the popular idea, for it was found (1) that where louping-ill existed the tick was sure to be; (2) that where the parasites were absent there was no louping-ill; (3) that the appearance of the parasites on the sheep in early summer was concomitant with the annual outbreak of the disease. Ticks are occasionally found on land free from louping-ill. From this it is concluded that these parasites are the conveyers or inoculators of a poison existing in the herbage or soil; for by improvement of the land by ploughing and liming, by artificially feeding the sheep, and destroying old grasses, the natural cover of the ticks, "louping-ill" has been entirely eradicated. The tick is a true blood-sucking parasite, belonging to the family *Ixodidae*, provided with a serrated rostrum or beak, which enables it to pierce the skin, and retain its hold very firmly. It is generally to be found where old grasses are abundant, which afford it cover during the season at which it is not obtaining blood from the sheep. On first leaving the ground to attack an animal it is very small, often no larger than a pin's-head, and the congregation of numbers makes the part affected appear quite black. When once fixed they will hang for days together sucking the blood, until their bodies become distended to eight or ten times their original size; nor do they quit their hold until they die, the eggs remaining dormant until the following spring, when new broods are hatched to commence the attack as before. Mr. Brotherston has done good service by publishing the results of his investigations on this subject; and the remedies suggested in his report deserve the careful attention of sheep farmers throughout the country.—Ed.]

MAMMALIA.

Voracity of the Shrew.—One day last summer I caught two Common Shrews. I placed them in a tin box, and supplied them with plenty of

insects and ants' eggs. On reaching home an hour afterwards I found that one shrew had torn out and devoured the intestines of the other. On placing the survivor in a case with vipers and snakes, he at once attacked them, biting furiously at anyone in his way. The vipers hissed, but did not strike him; and the snakes tried to avoid him. I was at length compelled to remove the shrew for the safety of the reptiles. Is it not probable that snakes and vipers have a destructive enemy in the mole, for when in their winter sleep they are completely at his mercy. In winter he seeks large heaps of stones, and such places as those in which reptiles hybernate, and he will attack any small animal.—C. WITCHELL (Stroud).

Natterer's Bat in Co. Cork.—On the 7th of April last, while walking through the woods of Castlefreke, Co. Cork, the seat of Lord Carberry, my attention was attracted by seeing a bat flying about in the sunshine at 2 o'clock in the afternoon. At first I thought it had probably been disturbed accidentally from its resting-place, and was straying about lost in the sunlight; but presently I saw that it was catching insects; and after a little it alighted on the trunk of a tree, and I was enabled to watch its proceedings. It was munching a large moth, and pushed the insect into its mouth with its thumbs, and I could hear the crackling of the moth's armour as it disappeared. I saw that it was a Long-eared Bat (*P. auritus*). I put my hat over it, but it managed to creep out underneath and escape. About an hour later I observed another bat in a different part of the wood, which, like the former, stayed in the open sunshine, and seemed to prefer it to the shade of the trees. I noticed that this bat was more lively in his movements than the one previously observed. I followed it for a long time before it pitched, and then it was too high in a tree, hanging by one foot. However I soon dislodged it by throwing at it, and it again alighted, this time low down on the trunk of a tree. After one attempt and failure, I eventually secured it. On referring to 'Bell's Quadrupeds' I had no doubt of the species being *V. nattereri*, the tragus being three-fourths the length of the ear and sharp at the tip, and the absence of any notch on the outer margin of the ear; the cilia on the inter-femoral membrane were well marked; the colour was brownish grey above and light coloured beneath. Mr. A. G. More has since confirmed this identification, and the specimen is at present in the Royal Dublin Society's museum.—J. FOLLIOTT DARLING (Clonakilty).

[Bell calls this the "Reddish Grey Bat," a name which does not sufficiently distinguish it from other species. "Natterer's Bat" is a better English name for it. We have notes of its occurrence in Dublin, Kildare, and Wicklow, and in very many counties of England, chiefly midland and southern; and on turning over our journals we find the following entry relating to it:—"August 24th, 3 p.m., at Midhurst, Sussex, saw Natterer's

Bat flying round an almost leafless oak near the river." We have several times met with it near London, in localities to the north and north-west.—ED.]

Pine Marten in Northumberland.—A fine specimen of the Pine Marten, *Martes abietum*, was captured alive on May 23rd, in the grounds of Mr. J. Hedley, near Chirton, in this county, and is now in my possession. At first it was very fierce and untractable, burying itself in the hay of its bed, and refusing to feed if looked at. It is now becoming more reconciled to captivity, and I trust that by kind treatment I shall be able at least partially to subdue its ferocity. The soft close fur of the head, neck, body, and tail is of a rich chocolate-brown; the ears, which are rounded and about an inch in length, of a light brown; the chin, throat, and breast are yellowish white, with a few scattered brown spots. Martens are now extremely rare in the North of England, but a few still linger in the wilder parts of Cumberland and Northumberland. — WM. YELLOWLY (South Shields).

BIRDS.

Marsh Warbler at Taunton.—Through the kindness of Mr. John Marshall, of Belmont, Taunton, I have just been able to add a clutch of Marsh Warbler's eggs to my cabinet. The nest was taken near Taunton on June 7th, and, like all previous nests obtained, was attached to stems of meadow-sweet. It contained four very prettily marked eggs.—MURRAY A. MATHEW (Stonehall, Wolfscastle, Pembrokeshire).

The Ring Ouzel in Captivity.—Mr. J. F. Darling's remarks (p. 239) remind me of a special favourite of my own, which reached me in January, 1881, in a cigar-box. Although it was 6 p.m. she took a bath at once by the light of my reading-lamp. Subsequently she became much attached to me, and, as I gave her the run of my rooms pretty often, she became thoroughly at home on my shoulder, and would peck the pen with which I might be writing. She delighted to tear my blotting-paper into shreds; but a great amusement was to lift pens, pencils and sealing-wax in turn out of the tray in which they generally rested; dropping them on to the floor she would hop away, to turn round with a look of surprise at the empty tray. Any interference she received with mock ferocity, depressing the head to attack my fingers, erecting also the feathers of the occiput and back in manifest glee. Like Mr. Darling's birds, mine enjoyed black beetles and bread and milk; but she was partial to shredded meat, and wild berries pleased her in the fall. Mr. Darling's remarks on the notes of the Ring Ouzel, and the attitude in which a caged example sits, are so precise that I need not add to them; but I may say that my bird began to sing at 7 a.m., and sang from February to July. Latterly absence from home led

me to billet "Toby" on the cook, in whose care she flourished, and developed conservative principles. So averse was she to innovations, that when her cage was changed, she refused food for twenty-four hours; and if her zinc bath was placed in the right corner of her cage instead of the left, she indignantly cast in her lot with the "great unwashed" until the offence had been removed. After keeping her sixteen months I sent her to console a forlorn male Ring Ouzel in the Western Aviary, whose wild rich notes had won my heart. Though the Ring Ouzel is one of the rarest Norwegian thrushes, I long watched a fine old male near a station in the Romsdal in 1878. During the severe winter of 1880-81 a single Ring Ouzel made his appearance on the garden-lawn of a house at Charlton, where my friend Mr. W. F. D. Curtoys was visiting, and shared the sparrows' crumbs; two others lingered in the neighbourhood, but were too shy to approach the house. I know of another example shot in Devon in the winter following. My correspondent Mr. Ebdell observed a newly-arrived male Ring Ouzel at Ripon on March 4th, 1883, apparently much exhausted by a long flight.—HUGH MACPHERSON (Carlisle).

Swallow and Wren nesting in proximity.—In a corner of an arbour in the grounds of Duff House, belonging to the Earl of Fife, and about a mile from Banff, there is now (June 13th) a Wren's nest and a Swallow's nest in such close proximity as to be actually attached to each other. The one, a round ball of moss, has an opening, just above the edge of its neighbour, about as large as would admit an ordinary thumb. The other, cup-shaped and open at the top, is composed externally of mud, but internally is well lined with feathers. The Swallow's nest, at the date mentioned, contained eggs; but of the contents of the Wren's nest I can say nothing. Wishing that both birds might succeed in their work of incubation, and knowing the extreme susceptibility of the Wren in regard to interference with its nest, I refrained from inserting my fingers. I do not remember to have ever seen two objects placed naturally together, and presenting such a remarkable contrast as these nests; certainly not in bird architecture. The curiosity must be seen to be rightly appreciated, as most if not all things in Nature must be.—THOMAS EDWARD (Banff).

The Hooded Crow in Ireland.—Mr. H. Chichester Hart's remark (p. 225), that the Hooded Crow is rarely seen near Dublin, suggests to me that the notes of another observer may be of interest. During the past six or eight years I have frequently seen Hooded Crows, generally singly, and never more than two together, feeding on the shore in the neighbourhoods of Malahide, Clontarf, and Ballybrack. It is a species which, although not plentiful, is by no means uncommon on those parts of the coast that it does frequent. At the end of March, 1878, I found a pair breeding in a small clump of trees at Finnstown, near Lucan, Co. Dublin. The nest was

placed in the fork of a Scotch pine, and was well sheltered by the foliage. It was composed of sticks and twigs, and lined with moss and sheep's-wool, and contained six eggs. Last year I noticed a pair nesting in a somewhat similar position near Celbridge, Co. Kildare. When in the Island of Achill with my friend James W. Banks, in the autumn of 1879, we noticed a peculiarity of colour, or rather shade, in the Hooded Crows there. The grey parts were of a lighter shade and a bluer tinge than in any of these birds I have seen elsewhere. It was particularly so on the nape and upper part of the back. The only part of Achill where we saw Hooded Crows was in the neighbourhood of Keem Bay, and the adjacent village of Keele. The birds of this species which I have seen in Co. Antrim, on the Co. Clare coast, and in the Aran Isles (usually mis-spelt Arran), show nothing of this peculiarity. So far as I have observed they are not much more numerous on the west coast than on the Co. Dublin shore.—J. E. PALMER (Lyons Mills, Straffan, Co. Kildare).

The Sparrow and his Ways.—I have all my life been a friend to the House Sparrow, and have defended him against many charges brought against him. Last year, however, I saw an abstract of a paper read at the Essex Natural History Society by Major Russell, in which this bird was denounced most emphatically. Major Russell contended that the Common Sparrow was causing the extinction of the House Martin, and gave some weighty evidence in proof thereof. I have been in consequence induced to pay particular attention during the summer to this bird, and I am able to endorse all, if not more than Major Russell stated against it; for the Sparrow not only steals away the nest, but ruthlessly destroys that of every bird which happens to be weaker and has a softer bill. Our summer migrants no sooner select sites for their nests than they are attacked and driven away, and the aggressor may be seen strutting across the lawn as though he had done a good deed, dauntily proclaiming himself "cock of the walk." The side of my house is covered with creepers, in which numerous Sparrows had built their nests, most of which were formed from the commenced nests of other birds. Now, as I preferred the migrants, and Chaffinches, Water Wagtails, Greenfinches, Goldfinches, and Grey Linnets, I ordered the Sparrows to be destroyed and three-brick-traps to be set, in which fifty of these pirates were taken. Most of them, however, were hens and young birds, the old cocks being too crafty for a brick-trap. I shall continue the same plan this year, and hope to make some impression upon this horde of robbers. I make no direct charge against the Sparrow on the score of food, though he persistently robs the chickens, keeping all other birds at a distance; but I suspect that, when I continue my observations during the present summer, I shall find he is more granivorous than insectivorous, and I shall have to denounce him as an enemy to the agricultural interests.—C. R. BREE (Colchester).

British Redpolls.—I have read with much interest the suggestion of Mr. J. H. Gurney, junr., that the large and pale-coloured Lesser Redpolls, which are often to be met with, are hybrids between the two species. I have examined a great many living examples in East London and elsewhere, and I incline to think that two races of Lesser Redpoll can be distinguished. Of course there are "dwarfs" also, which are clearly late or weak birds. But though the larger race, which I have often seen in Oxfordshire, is frequently confused with the Mealy Redpoll by dealers, I am inclined to think that it is both too numerous and too constantly identical in notes and song with the smaller and tawnier bird to have any blood of the Mealy Redpoll, which latter differs so decidedly in notes and in individual traits from the common bird. To my mind it is quite as natural that there should be two races of Lesser Redpoll as two races of the Dunlin or Wheatear, which I believe to be the case. But though I have kept a large number of Redpolls and examined many more, I make these remarks with all deference.—H. A. MACPHERSON (Carlisle).

Choughs in the Co. Waterford.—On the 22nd May inst., I took the Chough's nest mentioned (p. 252) as having been re-lined ready for eggs on the 9th. We found the female hatching, but on being disturbed she remained uttering her cry from the rock above. These Choughs must have been singularly unsuspecting to use the nest which we had visited on three previous occasions, splicing ladders together to reach it each time. It was built of stems of heather, the smaller branches of furze, with some stalks of bracken and woodbine; inside this was mixed a little grass with a thick lining of cow's-hair and wool, the cavity being rather broad and open; it contained three eggs, one only of which showed slight evidences of incubation. Further round the coast I saw a pair of Choughs fly into the crevice whence their eggs had been taken on the 9th. Taking a further survey from a boat of a spot where Choughs were said to breed every year, another pair of these birds came dropping down after their manner with closed wings, and regardless of our presence flew to their nest before our eyes; it was, as usual, in a hole over a cave of considerable height. I then landed, and on descending to their nest by a rope I found three young birds, from a week to a fortnight old, indistinguishable from young Jackdaws of the same age, several broods of which I had seen the same day (May 22nd). I did not molest this nest. Thus out of five nests examined two contained two eggs each, one three eggs, one three young, and one five eggs. A man who took five Choughs'-nests in the same locality about five years ago told me that these contained two and three eggs each, not more. In another place, on being lowered to a fissure in the top of which was said to be a Chough's-nest, I could just see the bottom of a nest from below; the only entrance being through a small hole in the top of the fissure, and the position quite impregnable. — R. J. USSHER (Cappagh, Co. Waterford).

Song of the Grasshopper Warbler.—Walking along the sunny side of Bruerne Wood, near Chipping Norton, on April 30th, I came to a spot where some trees had been cut down, and where the young saplings growing out of the long grass were only two or three feet high. Here I caught the unmistakable “reel” of the Grasshopper Warbler, the ventriloquism of which was very obvious; but the bird uses a *crescendo* in the middle of a long spell at it, which betrays his position. Thinking that I might possibly get a sight of it, I crossed the low hedge, and got in among the grass and saplings up to the point where I had heard it. I made a great crackling and noise in the dry grass, which was not to be helped; but nevertheless I very soon saw the bird about ten yards away, perched on a twig. The feature which most attracted my attention was the long and very flexible olive throat, which was moved about a great deal, thrust forward, and again drawn back so as to fold like a double chin. I have no doubt that the ventriloquistic power is connected with this long neck; but when the bird again begun to “reel” he turned his tail towards me, so that I could not so well see the throat at work. So far as I could see, however, there was no very marked vibration of any part of the body in making the noise, to which I then listened for some minutes, but failed to hear a longer effort than forty seconds by my watch—though the bird was quite at ease, I think. At this point my little terrier came worrying about in the grass and the bird became uncomfortable, though it was some time before it left its perch. When it did so it moved with a peculiar half-flying, half-creeping or climbing motion, *e. g.*, it *ran* down a sapling, or looked as if it did so, using its broad tail freely to balance itself. It finally disappeared in the grass under a little bush, from which I started it again, but not before I was almost treading upon it. My field-glass enabled me to see the bird almost as well as if it had been in my hands.—W. WARDE FOWLER (Lincoln College, Oxford). [Communicated by Mr. O. V. APLIN].

Waxwings in Cumberland.—About six examples of *Ampelis garrulus* were shot in the Carlisle district between December and February, 1882–3, an old female and a young male being obtained within 30 yards of a farmhouse at Cotehill. Early in March I spent a day in searching for the only member of the flock surviving; but, though it had been seen shortly before, I never caught a glimpse of it; nor did I hear the call-note, which I know well. All those shot had been gorging themselves on the berries of the wild rose.—H. A. MACPHERSON.

Black Redstart in Kent in May.—On May 9th, having been fishing in some preserved water in this neighbourhood, I saw a Black Redstart. I was in a waggonette at the time on my way home, and my keeper was with me and saw the bird as well very clearly. The bird was an old male, as I inferred from the plumage being perfect. It was close to the road and very

near me when I first observed it; and after settling twice on the ground, just before my waggonette, it flew into a large group of ash and sycamore, and settled *against* the trunk of a tree near to the ground, running up the bark for a few feet in a diagonal position apparently with ease. It then flew off the trunk into the foliage, and I lost sight of it. Gould describes the bird as a winter visitor, "arriving in autumn, and taking its departure when winter is over." The bird that I saw on June 9th has appeared therefore at an exceptional season; and since France and Belgium are mentioned as its breeding places there seems to be no reason why it should not breed here, and possibly there may be a pair in the locality where I saw the male. I have mentioned the circumstance to the owner of the place,—a park in this neighbourhood; and if there is a pair breeding it is possible that they may be observed.—W. OXENDEN HAMMOND (St. Albans Court, near Wingham).

[The Black Redstart is said to have bred in Nottinghamshire.—ED.]

Pied Flycatcher in Northamptonshire.—I have in my possession a male specimen of the Pied Flycatcher, *Muscicapa atricapilla*, which was shot at Haileston, four miles from Northampton, on the 1st May last. I know of no instance of any specimen of this bird having been obtained in this county before.—W. TOMALIN (Northampton).

French Partridge nesting on a Rick.—On returning home this evening (June 7th) I found on my table some eggs of the French Partridge, and, on enquiring where they had come from, I was told that they had been taken from the top of a straw rick. I went with the farmer to the place, and he stated that, when taking down the straw to sell, his man found the nest at the very top. He went up to look at it, and found thirteen eggs. He would have left the nest, but had to continue taking the bundles from that end of the rick. It would have been interesting to see how the old bird would have got the young ones down, for the height was at least twenty feet from the ground.—H. EVELYN RAWSON.

[On June 13th, as we learn from another source, a nest, with thirteen eggs, of this bird was found on a rick at Bishops Waltham.—ED.]

Imported Game Birds in the English Markets.—I am rather surprised not to have seen any notice of the remarkable abundance of the Black Grouse in every poulterer's stall last March. These birds appear to have signalled the close of the game season by arriving in immense numbers, far exceeding the usual supply. They were speedily dispersed over the country, and sold at six shillings and seven shillings a brace. Having applied to Messrs. Hunter and Son, of Leadenhall Market, I was informed that in February they sold between 400 and 500, and in March nearly 350; but this did not represent a tenth part of the number sold in the market, or sent to provincial dealers all over the kingdom. Hazel Grouse, which,

until a few years ago, it was most unusual to see, were far more abundant than they have been before. It is likely they will rise into greater favour, for they have delicate white flesh, are excellent eating, and sell readily at from three shillings to four shillings a brace. Willow Grouse (called "Ptarmigan" by the dealers), on the other hand, were very far from being in their customary abundance. Nineteen-twentieths of the so-called Ptarmigan are Willow Grouse, and the reason I take to be, not so much that the true Ptarmigan lives in inaccessible places, as that it is far less numerous as a species. One game-dealer received a consignment of the Grey Partridge from Russia, very slightly differing in plumage from our own, which is considered to be exactly the same species, the principal difference being in the pectoral spot, or horse-shoe, which in some of the old males was a deep chocolate, almost black on the edges. If any evidence were wanting that game-birds are not decreasing,—although Black Grouse may be suffering in some parts from drainage, and Quails from their indiscriminate massacre in spring,—a single glance at the cargoes which come to this country in the winter ought to be enough. It is probable that Norway, Sweden, Russia, and Germany furnished the Black Grouse which came over last winter, and no doubt plenty more remain where so many came from. One hundred Waxwings were sent from Russia, as I was informed by Mr. Brazener, of Brighton, at whose shop several of them may be seen, set up as beautifully as any English specimen. These came with the game, but were no doubt intended for the benefit of bird-stuffers, to whom of course they would be sold. In Russia many are sent to market, and sold for a few "copecks," with Pine Grosbeaks and other rarities.—J. H. GURNEY, JUN. (Northrepps, Norwich).

Hybrids amongst Birds.—In thanking Mr. J. H. Gurney, jun., for his notes on this subject (p. 256), I take the opportunity of making a few remarks on hybrids, including those he has specially mentioned. As regards the Blackbird and Thrush hybrids, I am, like himself, not a great believer in them, and I should be disposed to doubt their existence altogether unless I had something more decidedly apparent than mere brown colour on a Blackbird—as, for instance, the spotted breast-feathers and shorter tail of the Thrush, either one or the other being sure to appear on a true Blackbird and Thrush hybrid. I believe that wild-bred hybrids are extremely rare, and are generally, if not always, produced through either one or the other of the parent birds being unable to obtain a proper mate, and this would be exceedingly unlikely in the case of either the Blackbird or the Thrush. Some years since, when Black-game were very scarce—in fact, nearly extinct—in the adjoining county of Carmarthen, I heard of an old Blackcock that always accompanied some hen Pheasants on the farm where he had been bred, his Grey-hens having unfortunately been killed. Some hybrids were the result, some of which were killed, and, I regret to add, eaten.

My informant tells me that they very much resembled a hen Pheasant in shape and plumage, the cross showing itself in a slight leg-feathering and in the dark and light-coloured flesh on the breast, as in the Black-game; he also adds that the flavour was delicious, surpassing, in his opinion, the best Pheasant he had ever eaten. Soon after this, a fresh stock of Black-game spread from this county into Carmarthenshire, where they have since increased to an extraordinary degree; Grey-hens became abundant, and from this time I have heard of no more hybrids being killed. In fact, the old Black-cock above alluded to returned to the Grey-hens the moment he had the opportunity. I mention this because I think it shows a good reason, though perhaps not a conclusive one, for the production of wild-bred hybrids. Will Mr. Gurney kindly say if the hybrids he mentions between the Greenfinch and the Linnet were wild-bred? because there is such a dissimilarity in size between the two birds that it makes one rather sceptical. I can understand the Hooded Crow mating occasionally with the Carrion Crow, as they are so very nearly allied. I am not aware whether this is a common cross or not, and I fancy there must be some good reason for its taking place, which might possibly be detected by careful observation before or during mating. The breeding of the two Redpolls is also somewhat uncertain, as I imagine size would be almost the only indication. From these remarks it will be gathered that I believe Nature runs strictly in her own allotted grooves, and it is only when she fails to do so that the survivor seeks for a mate as nearly as possible allied to his or her species, and the result is, after all, only hybrids incapable of breeding *inter se*. The whole subject is, however, most interesting, and so little is known of the cause of the production of wild-bred hybrids that any information will be most acceptable.—E. CAMBRIDGE PHILLIPS (The Elms, Brecon, S. Wales).

Hybrid between Greenfinch and Linnet.—I have in my collection of varieties a hybrid of this kind caught in a wild state in Cambridgeshire; also one between a Goldfinch and a Linnet, shot near Mansfield.—J. WHITAKER (Rainworth Lodge, near Mansfield, Notts).

Yellow Wagtail in Co. Dublin.—During the first week of June, when walking with my wife along the shore from Malahide to Portmarnock, she drew my attention to a very pretty yellow bird perched on the branch of an old elder bush. I thought at first it might be a bright-coloured specimen of the Grey Wagtail, *Motacilla sulphurea*, but the absence of the triangular black patch on the throat made me observe the bird more closely. As Knapp says ('Journal of a Naturalist'), it seemed to court attention, and gave us ample opportunity of observing its plumage and movements. On reaching home I consulted Knapp, Yarrell (4th edit.), Harting ('Our Summer Migrants'), and our Irish authorities, Thompson and Watters, and found the plumage to be as therein described. It is the rarest of our three Irish

Wagtails, and when it does pay us one of its "few and far-between" visits, it generally chooses the shores of Lough Neagh as a summer residence. Of four specimens in the Royal Dublin Society's Museum three are from Lough Neagh, and the fourth from Baldoyle, a few miles from my observation. The Grey Wagtail—a common enough bird in the city—is perfectly familiar to me, and I have no doubt whatever that the pretty bird I saw at Malahide was the Yellow Wagtail, *Motacilla Raii*. — J. ROYSTON (35, Bloomfield Avenue, Dublin).

Cuckoo's Egg in a Thrush's Nest.—A Cuckoo's egg was taken out of a Song Thrush's nest here the other day. It is the first instance, so far as I know, in this neighbourhood of the Cuckoo's egg having been found in the nest of the Thrush. We have taken several Cuckoos' eggs this season, but, with this exception, all from the nests of the smaller birds.—JOHN H. WILLMORE (Queenwood College, near Stockbridge, Hants).

[The Song Thrush is one of the least common amongst the foster parents of the Cuckoo. Other instances of the kind have been previously recorded, but they are certainly rare. See 'The Ibis,' 1865, pp. 178—186.—ED.]

REPTILES.

Food of the Common Ringed Snake.—Mr. Stradling, in his very interesting paper in 'The Zoologist' on the treatment of Snakes, states (p. 248) that in the case of the Common Ringed Snake its "favourite food is frogs." I may mention that I have, in former years, examined many of these snakes, and have come to the conclusion that they prey chiefly on toads, which I have found to form the most frequent contents of the Common Snake's stomach.—J. H. GURNEY (Northrepps Hall, Norwich).

Ground Colour of the Viper.—I have often observed how closely the ground colour of the Viper (*Pelias berus*) agrees with that of the soil on which it is found. On the Cotteswolds we have the white, red, and dark brown varieties. I have always found the white variety living in a white stone wall, the brown variety on the Fuller's earth and inferior oolite, and the darker variety on a darker soil.—C. WITCHELL (Stroud).

Origin of the Name "Gavial."—In last month's 'Zoologist' I observed that the Long-nosed Crocodile of the Ganges is called by Mr. Francis Day the *Gavial*. The prevailing name of the reptile in the language of the Hindoos of the Ganges Valley is *Ghariyal*; and it is my impression that this word having been first written *Garial* in English, was in the course of correspondence converted into *Gavial* by the letter *r* being mistaken for a *v*. If my impression is well founded, naturalists may think it worth while to adopt the correct transliteration of the Hindi word, and establish in their literature the form *Ghariyal*. Mr. Day is, I presume, the author of the well-known work on Indian Fishes; if so, his experience of the Indian

Continent was, I believe, mainly confined to the Madras Presidency, where the vernacular of Gangetic India is a foreign tongue.—C. DONOVAN, JUN. (Myross Wood, Leap, Co. Cork).

FISHES.

Sea Lamprey killed by an Otter.—On May 29th I had an opportunity of examining a large Sea Lamprey, *Petromyzon marinus*, which had been rescued from the jaws of an Otter by a keeper, who was walking on the banks of the tidal portion of the River Tavy. It was an exceedingly fine specimen, full of spawn, measuring $33\frac{1}{2}$ inches in length and turned the scale at three pounds. On seeing the keeper, the Otter made off, leaving its prey behind. Sea Lampreys are by no means common with us.—JOHN GATCOMBE (55, Durnford Street, Stonehouse, Devon).

A Conger in a Lobster pot.—Last May, during a visit to Jersey, I went with a fisherman to visit his Lobster pots, with the idea of obtaining any interesting Crustacea that might have entered with the Lobsters. We were not very successful: one pot contained a large number of the common *Carcinus manas*, of a variety of colour and markings; in others we found *Portunus puber*, *Cancer pagurus*, *Palamon serratus*, and *Pagurus bernhardus*. Of course there was a quantity of molluscs, and a few fish. Presently we hauled a pot that contained a good-sized Conger; in fact he had just managed to get into the pot; but the remarkable part of it was that he had swallowed the bait and hook on one string (the bait being hung to the lip of the pot on a large hook attached to about nine inches of string). He had then evidently managed to reach and swallow another bait and hook, for when we found him he was firmly fixed, the two lines being taut, and diverging from his mouth to the two opposite sides of the pot's mouth. The voracity of these animals does not appear to be in any way interfered with by bodily pain, for it was evident that this fellow had the first hook pretty firmly embedded in his gullet before he attacked the second.—EDWARD LOVETT (Croydon).

MOLLUSCA.

Limax cinereo-niger an Addition to the List of British Slugs.—Until now this species—a conspicuously marked and readily recognisable form—has been regarded by British conchologists as a form or variety of *L. maximus*. It is now regarded by the best continental authorities as a valid and distinct species. It differs both in external and in anatomical characters, the latter turning upon the structure of the generative organs. Its external diagnostic characters are the following:—The shield is unicolorous, without markings, or only exhibiting slight traces towards the margin; the respiratory orifice is margined with a darker hue of the body-colour; the body is, like the shield, usually unicolorous; the dorsal keel and a line continuing it to the posterior extremity of the shield are usually

conspicuously different in colour from the general tint of the body; and the sole, or lower surface of the foot, is divided longitudinally (by two furrows) into three differently-coloured bands, the median one being white, and the two lateral ones dark. Speaking roughly, the typical examples may be described as being uniformly black, with a white line down the middle of the black, and a longitudinal median white fascia on the foot. It, however, varies to a large extent. Some specimens have occasional white blotches on the dark body, and others are uniformly black, not even the keel being light. This slug has occurred in these islands, but as not very much attention has been paid to slugs in Britain we know next to nothing of its range. Forty years ago the Rev. B. J. Clarke, who paid considerable attention to the Irish slugs, found this form at Spire Hill, Queen's County; and Mr. Robert Ball found it in the County Cork. Twenty years later the Rev. A. Merle Norman, when studying the inland Mollusca of Somersetshire, found a specimen in Cleeve Combe which he describes as "altogether pitchy black, without spot or marking of any kind, and fully six inches long." This was evidently the var. *nigra* of *L. cinereo-niger*. On the Continent the typical *L. cinereo-niger* has a wide range. It is found in France, Italy, Germany, Transylvania, Scandinavia, &c., and it would be a point of very great interest to determine its actual range in the British Isles. To this end I should be glad to be favoured with specimens of this (and indeed of any British slugs) from as many localities as possible. Among the slugs there is a wide and interesting field of investigation open, and but few have attempted the study. — WM. DENISON ROEBUCK (Sunny Bank, Leeds).

ANNELIDES.

Earthworms and their Distribution.—At a time when so much interest has been aroused in the habits and life-history of Earthworms by the publication of Mr. Darwin's work on that subject, I feel sure that a paragraph in a letter received not long since from my friend Mr. E. E. T. Seton, of Carbery, Manitoba, will prove acceptable. Darwin says that Earthworms occur in nearly all parts of the world, even in Iceland, and I believe the United States (I have no copy of his work at hand), but my friend writes of his neighbourhood that, "Notwithstanding Darwin (peace to his ashes!), there is not the ghost of an Earthworm within hundreds of miles south, and never has been." This, it must be remembered, is in a country the great fertility of which is always attributed to the layer of black surface-soil a foot or more thick, and extending for hundreds of miles either way, if not entirely across the continent of North America. At first thought one would naturally regard this as "vegetable-mould" due to the action of worms, but under the circumstances it seems as if some other explanation were necessary.—R. M. CHRISTY (Chignal St. James, near Chelmsford).

ARCHÆOLOGY.

A Whale in the Thames in 1658.—A fuller description of the Greenwich Whale referred to at p. 131 as advertised in the 'Mercurius Politicus,' June 3rd, 1658, will be found in the 'Diary of John Evelyn,' under the same date. The Whale referred to is clearly the same in both cases.—H. A. MACPHERSON (Carlisle).

SCIENTIFIC SOCIETIES.

LINNEAN SOCIETY OF LONDON.

May 3, 1888.—Sir JOHN LUBBOCK, Bart., M.P., F.R.S., President, in the chair.

Sig. O. Beccari and Dr. J. Lange were elected Foreign Members of the Society.

Mr. William Galloway exhibited an extensive series of the osseous remains of the Great Auk, Otter, and other animals, along with bone implements, being part of the material dug out of the mound of Caistednan-Gilleann, in Oransay, by himself and Mr. S. Grieve in 1881-82.

A second contribution on the *Asteroidea* of the 'Challenger' Expedition, by Mr. W. Percy Sladen, was read. In this the author draws attention to the "cribriform organs," peculiar structures associated with special functions found in *Porcellanaster*, but as yet unknown in other Starfishes. The organs in question are situated on the marginal plates in the intertrachial angles, and they may vary from one to seven in number. They consist of greatly compressed spinelets or lamellæ ranged in vertical parallel lines, and invested with a membrane, which appears to have been furnished with vibratile cilia. Functionally they may act as percolators, and lie homologous with the minute ciliary spines bordering the vertical furrows of the marginal plates of *Astropecten* and other forms. In *Porcellanaster* they are strictly lamellar, whilst they are papelliform in the allied genera *Hyphaster*, *Styracaster*, and *Thoracaster*. Mr. Sladen further describes in detail the last-mentioned three new genera—of five in all; and of twenty-seven species some twenty-one are entirely new to science.

There followed a paper by Mr. George Brook, "A Revision of the Genus *Entomobrya*, Rond. (= *Degeeria*, Nicolet)." In this communication a historical *resumé* is given of what divisions, &c., of the group of *Podura* more immediately under consideration have been made by previous observers. From researches into the literature and his own observations, the author arrives at the conclusion that in the genus *Entomobrya* we have a common widely distributed form, which, at different ages and under different con-

ditions, presents gradations of colour from the light to the dark shade, and these have been named accordingly as separate sorts by various authors. Something of a similar kind has already been proved to occur in *Orchesella cincta*, Linn. References, descriptions, and synonyms are given of several species, both new and of those already known, to which are added figures of the insects themselves and their structural peculiarities.

The nineteenth contribution to the molluscan fauna of the 'Challenger' Expedition, by the Rev. R. Boog Watson, was read, in which descriptions are given of a number of new species of *Bullidæ*.

ANNIVERSARY MEETING, May 24, 1883.—Sir JOHN LUBBOCK, Bart., M.P., F.R.S., President, in the chair.

Mr. R. M'Lachlan, for the Audit Committee, read the statement of receipts and payments for the year. The Treasurer (Mr. Frank Crisp) followed with a detailed explanation of the various items; £750 had been invested, making a total of about £5000, and a balance at bankers (30th April) still remained of £514 8s. 7d.

The Secretary (Mr. B. D. Jackson) read his annual report. Since the last anniversary eleven Fellows and one Foreign Member had died and eleven withdrawn, while fifty-four new Fellows had been elected. Between purchase, exchange and donations, 407 volumes and 442 separate parts had been added to the Library.

Mr. G. J. Romanes, on behalf of the subscribers, formally handed over the portrait of Charles Darwin, painted by Mr. J. Collier, its exhibition at the Royal Academy last year having then prevented its presentation. A bust of the late Prof. Louis Agassiz, by the American sculptor, Mr. Hiram Power, was handed over by Prof. Allman to the Society as a present from the sculptor's son, Mr. H. Power, of Florence. An engraving from Gainsborough's painting of the English naturalist Thomas Pennant was presented by Mr. Howard Saunders, in the name of Mrs. Alston, as a bequest from her son, the Society's late Secretary, Mr. E. R. Alston.

The President then delivered his anniversary address, commenting generally on the events of the past year, with special reference to their bearing upon the Society. In congratulating the Society on its annual balance sheet he reminded the Fellows that, besides investments, the property of the Society might be valued at £25,000, or a total of £30,000. He alluded to Colonial Fellows and the good scientific work they are doing, incidentally referring to the British Association meeting in Canada in 1884. Reference was also made to the progress of re-arrangement of the biological collections in the new Natural History Museum at South Kensington.

This was followed by reports on the various botanical and zoological publications issued at home and abroad during the last twelve months. Remarks were made on the stock of the Society's 'Journals' and

'Transactions'; also on the purchase of a portrait of Jacob Bobart (1598—1679), and the President himself presented a valuable portrait of Linnæus, from life, by his countryman Magnus Hallman.

A resolution was unanimously accorded by the Society, at the instance of the chair, to Mr. G. Bentham and Sir J. D. Hooker, on the completion of their great work, the 'Genera Plantarum.'

The obituary notices of deceased Fellows was read by the Secretary. Of zoologists the sudden loss in early life of Professor F. M. Balfour, of Cambridge, and Mr. W. A. Forbes, Prosector to the Zoological Society, being deplored.

The Scrutineers having examined the ballot then reported that Mr. T. Christy, Mr. H. E. Dresser, Mr. G. Murray, Mr. H. Saunders, and Mr. H. T. Stainton had been elected into the Council in the room of Mr. H. W. Bates, Mr. G. Busk, Mr. C. B. Clarke, Sir John Kirk, and Mr. R. M. Lachlan, who retired; and for officers, Sir J. Lubbock as President, Mr. Frank Crisp as Treasurer, and Mr. B. Daydon Jackson and Mr. G. J. Romanes as Secretaries.

June 7, 1883.—Sir JOHN LUBBOCK, Bart., M.P., F.R.S., President, in the chair.

Mr. R. J. Clarke and Mr. Frank Matthews were elected Fellows of the Society.

Mr. George Murray exhibited specimens of Dace killed by the fungus disease (*Saprolegnea ferax*), the result of inoculation, and said to be the first recorded experimental proof of the communicability of the disease to those fish.

Prof. Cobbold exhibited some shrimps sent by Dr. Burge, of Shanghai. They contained immature flukes, which it was thought might prove to be the larval state of one or other of the three species of human fluke known to infest man in eastern countries. He proposed to call the parasite *Cercoaria Burgei*.

A communication was read from Mr. George Lewis, "On Japan *Brenthida*, and Notes of their Habits." These beetles form part of the collection made by the author in his visit to Japan during the summers of 1880–81. The author observes there is no geographical barrier sufficient to exclude tropical forms from Japan, but their environment when they reach it prevents them from establishing themselves, to any great extent at least, in the northern parts. In the southern islands of the Japanese Archipelago the warmer climate enables a fair number of beetles of a truly tropical type to exist. The fact that each genus is only represented by one species nevertheless points to some physical check in their spread and numbers. A new genus, *Higonius*, is characterised, and several species of this and other genera described and illustrated.

A short record of "Observations on the White Ants (*Termites*) of Rangoon," by Dr. Robert Romanes, was read by the Secretary. In this the details are given of what he saw in the swarming of a nest.—J. MURIE.

ZOOLOGICAL SOCIETY OF LONDON.

June 5, 1883.—OSBERT SALVIN, Esq., F.R.S., Vice-President, in the chair.

The Secretary read a report on the additions that had been made to the Society's Menagerie during the month of April, and called special attention to a female Mule Deer, *Cervus macrotis*, presented by Dr. J. D. Caton; and to a Great Black Cockatoo, *Microglossa aterrima*, and a Bluish Shrew, *Crociodura carulescens*, obtained by purchase.

Mr. Slater exhibited and made remarks on two birds obtained near Lima by Prof. W. Nation, and on a collection of birds made in New Britain, New Ireland, and the Solomon Islands, that had been sent to him for examination by the Rev. George Brown.

Mr. Slater also called the attention of the meeting to a Condor from Peru, living in the Society's Gardens since 1877, which he was induced to believe was a specimen of the "*Condor pardo*," or *Sarcorhamphus equatorialis*, Sharpe.

Mr. G. French Angas exhibited a collection of Butterflies made during a recent visit to the island of Dominica, West Indies.

A communication was read from Prof. Owen, entitled "Embryological Testimony to General Homology."

A communication was read from the Rev. O. P. Cambridge on some new genera and species of spiders. Eight spiders, representing as many new genera, were described; two of them belonged to the family *Theraphoridae*, one to the *Drassidae*, and the others to the *Thomisidae*. Three of these species were from Ceylon, three from Caffraria, one from New Zealand, and one from California.

A communication was read from Mr. A. G. Butler, containing an account of the Lepidoptera collected by Mr. H. O. Forbes in the islands of the Timor-Laut group. Examples of twenty-three species were obtained.

A communication was read from Mr. Herbert Druce, containing descriptions of some new species of moths of the families *Zyganidae* and *Arctiidae*, mostly collected in Ecuador by Mr. C. Buckley. The number of new species described was fifty, belonging to twenty-four genera.

A paper was read by Messrs. Godman and Salvin, containing remarks on the variations of certain species of butterflies of the genus *Agrias*.

Mr. G. A. Boulenger read a report on a collection of Reptiles and Batrachians from the Timor-Laut group of islands, formed by Mr. H. O. Forbes. Two new species were described—the one a lizard of the Australian

genus *Lophognathus*, and the other a snake of the Indian genus *Simotes*, proposed to be named respectively *L. maculilabris* and *S. Forbesii*. The snake was of special interest, as no species of the genus *Simotes* had hitherto been previously known to occur eastward of Java.

June 19, 1883.—Prof. FLOWER, LL.D., F.R.S., President, in the chair.

The Secretary read a report on the additions that had been made to the Society's Menagerie during the month of May, and called special attention to a fine example of the Surucucu or Bush-master Snake of South America, *Lachesis mutus*, presented by Mr. H. Y. Barkley, of Pernambuco, on the 22nd of May.

The Secretary read an extract from a letter received from Mr. Albert A. C. Le Souëf, containing observations on the coloration of the plumage of the Satin Bower-bird, *Ptilonorhynchus holosericeus*.

Prof. E. Ray Lankester read a memoir on the muscular and endoskeletal systems of *Limulus* and *Scorpio*, drawn up by himself with the assistance of his two pupils, Mr. W. J. Barham and Miss E. M. Beck. These investigations seem to confirm Prof. Lankester's previously expressed views as to the near affinity of these two forms, hitherto usually referred to different classes of the Animal Kingdom, and to justify the association of *Limulus* with the Arachnida.

A paper was read by Dr. Gwyn Jeffreys, on the Mollusca procured during the cruise of H.M.S. 'Triton' between the Hebrides and Faroes in 1882. Ten new species of Gastropoda were described, and another species (*Fusus Sabini*) was fully diagnosed. The chief interest of the paper consisted in the distinction of the Mollusca inhabiting the "warm" and "cold" areas of that sea-bed, in accordance with the views of Dr. Carpenter and the late Sir Wyville Thomson.

A communication was read from Mr. Martin Jacoby, containing descriptions of some new species of Beetles belonging to the family *Galerucida*.

Prof. P. Martin Duncan read a paper on the Madreporarian genus *Phymastrea* of Milne-Edwards and Jules Haime, and gave the description of a new species obtained on the west coast of India, which he proposed to call *Phymastrea irregularis*.

Dr. J. S. Garson read a paper on the anatomy of the Pygmy Hog of Nepal (*Porcula salvania* of Hodgson), as exhibited in a female specimen of this animal which had lately died in the Society's Gardens. Dr. Garson came to the conclusion that this animal was not sufficiently different from the true Pigs (*Sus*) to warrant its generic separation.

A communication was read from Mr. Osbert Salvin, containing an account of a series of birds collected by Capt. A. M. Markham, R.N., at various points of the western shores of the Pacific, from Esquimault on the

north to the Straits of Magellan on the south, including some from the Galapagos Islands and from the island of Juan Fernandez.

Mr. E. W. White read some notes on the birds of the Argentine Republic, being a supplement to two former papers read before the Society on the same subject.

A communication was read from Mr. A. Boucard, containing an account of a collection of birds made in Yucatan by Mr. Gaumer.

This Meeting closes the present session. There will be no more scientific meetings until the commencement of the next session, 1883-1884, in November next.—P. L. SCLATER, *Secretary*.

NOTICES OF NEW BOOKS.

Grouse Disease ; its Causes and Remedies. By D. F. MACDONALD, LL.D., &c. 8vo, pp. 182, with illustrations. London: W. H. Allen & Co. 1883.

THE precise nature of the Grouse Disease is still so far from being properly understood that any new publication on the subject would be likely to prove attractive, not only to naturalists, but more especially to sportsmen, whose interests are liable to be so seriously affected by the spread of this disorder.

Opinions hitherto expressed on the subject have been many and various. By some the disease is viewed as a contagious epidemic like cholera. Others regard it as a parasitic disorder. Others again consider it due to atmospheric influences, over-stocking, and an unhealthy condition, which forms the principal food of Grouse, and ought to be periodically burnt.

Not long since Mr. J. A. Harvie Brown communicated to this journal (November, 1882) his views respecting the Grouse disease, which he believes is to be attributed to a variety of causes, amongst which he specifies over-stocking, over-preservation, indiscriminate slaughter of so-called "vermin," and an unwholesome condition of the heather, after severe late frosts.

Dr. Macdonald thus sums up his own opinion in the matter:—"That it is caused by the mismanagement of the moors, insufficiency of natural food, by want of systematic heath-burning, by too great a preponderance of sheep, which nibble the heather-tops, over-stocking, severe frost, excessive rain, and the extermination of the birds and beasts of prey."

In this comprehensive expression of opinion, Dr. Macdonald would seem to have merely adopted the most plausible of the many theories advanced by previous writers, telling us nothing new about any of them. His book is on this account a disappointing one, and its utility, even as a compilation, is not a little marred by the amount of irrelevant matter which has been introduced on subjects which have no connection with the question of Grouse disease.

The illustrations, six in number, by A. T. Elwes, depict the Capercaillie, Blackcock and Greyhen, Red Grouse and Ptarmigan, and are spiritedly drawn, though in most of them the outlines strike us as being rather hard.

Another Book of Scraps, principally relating to Natural History: with thirty-six lithographic illustrations from pen-and-ink sketches of Wild Birds. By CHARLES MURRAY ADAMSON. Oblong 4to. Newcastle-on-Tyne: A. Reid, and Mawson and Co. 1883.

In 'The Zoologist,' 1882 (p. 501), will be found a notice of a former Book of Scraps by Mr. Adamson, similar in character to that now before us, though somewhat smaller in size, being an octavo instead of an oblong quarto.

The merit of the present publication lies in the cleverly reproduced pen-and-ink sketches, thirty-six in number, of groups of wildfowl and seafowl in characteristic attitudes. They are little more than outlines, although in most cases these are very true to nature, and betoken an observant eye and skilful hand on the part of the draughtsman.

Mr. Adamson has the happy knack of hitting off with a few bold touches the characteristic attitudes of birds, both at rest and in motion, and with some of the species he has been very successful in depicting their appearance on the wing; so much so that it is impossible to mistake the species for which they are intended. To naturalists his book will recall to mind many a truthful scene of bird-life as viewed along shore, or in the marsh, while to artists it will certainly offer many pleasing suggestions.

